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ABSTRACT

Geolinguistics is the developing branch of human geography concerned with the relationship of languages and their physical and human settings. It investigates the socio-spatial context of language use and language choice, measures language distribution and variety, assesses the relative usefulness and availability of different languages from various standpoints, examines variations in structures, and maps language relationships. Study of geographic variations in native language gains and losses in Wales, carried out for nearly a century in regular censuses, exemplifies the potential applications of geolinguistic analysis. As more practical solutions to the problems of multilingual societies are sought, the socioeconomic planning of language will gain importance. Geolinguistics, which increases awareness of the totality of language functions within a specific geographic area, can contribute to this process and to the recognition of language as an expression of unique identity. (MSE)

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ON MEASUREMENT AND APPLICATION IN GEOLINGUISTICS

Colin H. Williams

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DISCUSSION PAPERS IN GEOLINGUISTICS

No. 8

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DISCUSSION PAPERS IN GEOLINGUISTICS

The aim of this series is to initiate discussion in the spatial analysis of language. The following topics are indicative of the scope of papers we envisage publishing : spatial framework of language planning; socio-cultural influences on language maintenance and language change; spatial techniques for language analysis, difussion of language forms; regional variations in language, group contact and conflict in multilingual contexts.

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On Measurement and Application in Geolinguistics

Colin H. Williams

Colin Williams is a Principal Lecturer in Geography at the North Staffordshire Polytechnic

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Geolinguistics is a developing branch of human geography which reflects the increasing concern of its parent discipline with social problems, and with devising more appropriate methodologies for the analysis of time honoured questions of social investigation. Its specific concern is with the relationship between languages and their physical and human settings. Thus it may seek among other things to illumine the socio-spatial context of language use and language choice; to measure language distribution and variety; "to assess the relative practical importance, usefulness and availability "of different languages from the economic, psychological, political and cultural standpoints of specific speech milieux; to understand variations in their basic grammatical, phonological and lexical structures and to measure and map "their genetic, historical and geographical affiliations and relationships."[2]

There is little explicit agreement as to what constitutes the core of geolinguistic analysis but it may prove helpful to outline some of the sources which have contributed to its growth. The earliest identifiable interest lay in the work of European cultural geographers such as Vidal de la Blache, H.J. Fleure, Jules Gillieron and Edmond Edmont and their successors, eg. Estyn Evans and E.G. Bowen. They were concerned to portray the essence of the cultural perspective. For the French pioneers this essence was captured in the concept of genre de vie. Never fully defined the concept nevertheless emphasizes the contingent elements of culture as an integral part of the environment. As Lukerman suggests "the genre de vie or the culture of a population or place is explicitly an historical accumulation of habit. Human inventiveness and freedom are, above all, a social fact, not an individual exploit ..... The essence of French writing on genre de vie is an express emphasis on the historical background of social behaviour and on the force of social habit as the mechanisms of relationship with the physical

environment".[3]

These ideas, as W.T.R. Pryce shows,[4] represented a fundamental shift away from a human geography dominated by physical influences. Thus students of the Celtic languages such as E.G. Bowen, Estyn Evans and Emrys Jones were beginning to adopt normative concepts in order to explain spatial culture systems and increasingly they focussed on language as a culture surrogate for group identity on the Celtic fringe.[5] Their pioneering work based on a combination of census analysis and field-work interpretation has laid the foundation for the more comprehensive and sophisticated multi-variate analysis of today. Its lasting significance lay in the identification of distinct culture regions within the Celtic nations.

A second source of inspiration for geolinguistic analysis came from the interesting work of dialectologists and compilers of linguistic atlasses. Despite initial methodological problems relating to the training of fieldworkers, the construction of reliable questionnaries, the selection of informants and the consequent verification of the accuracy of dialect mapping, considerable progress has been made in this field. Indeed as Chambers and Trudgill show in their recent book "Dialectology" there is growing evidence for the emergence of a unified sub-discipline which they call dialectology. It is comprised of three elements - dialect geography, urban dialectology and human geography - and its unity is provided by the theoretical under pinning of variation theory, the set of premises and hypotheses which arises as a consequence of accepting the variable as a structural unit in the grammatical model.[6]

The only institutional outlet for geolinguistic research was founded in 1965 as the American Society of Geolinguistics. Its aims and range of activities reflect Mario Pei's concern to "channel socio-linguistic information to the informed layman". Its annual journal GEOLINGUISTICS is a catholic expression of its concern with "disseminating up-to-date knowledge concerning the world's present day languages." The variety and quality of the papers presented at regular meetings testify to the growing interest in this area of study. But for our

present purposes the interpretation of the geo in the A.G.S.'s geolinguistics is very loose and primarily indicative of the fact that they choose their lexical or phonological examples from various regions and parts of the world.

A more spatial interpretation of geolinguistics may be found in the work of Bill Mackey and his associates at the International Center for Research on Bilingualism at Laval. His pioneering work in the field has attempted a systematic analysis of languages in contact.[7] Professor Mackey has devised methods of standardizing and weighting the various 'power' each respective language may wield, their attraction at global, regional and local scales of analysis, and their status potential for prospective speakers, who for a variety of reasons, are in the process of language shift. His work integrates material from the social sciences and linguistics and offers a critical socio-economic assessment of language contact and change which has been underplayed in the past by students of language.

A related source of comparative analysis was of course the modernization school of social change in the 'fifties and 'sixties , as represented by the work of Deutsch and Lerner.[8] In their attempt to develop a communication approach to socio-political change great emphasis was placed on language, both as a political symbol of independence, and as a carrier of new ideas and a greater awareness of nationalism's potent mobilising force. In consequence we have a plethora of well conceived and executed case studies of languages in conflict for many sovereign states.[9] Whilst most political scientists and sociologists analysed the political role of language at the state or regional scale, sociolinguists and anthropologists in the 'sixties and 'seventies were often more concerned with reconstructing the influence of the local environment on language use, whether that environment be a rural, underdeveloped context or a racially mixed, urban neighbourhood in the U.S.[10] The net effect of these case studies is that we have an impressive array of data and interpretations to inform such crucial policy questions as the development of bilingual education programs, the granting of language rights to minority groups desireous of being served by government officials in their own tongue and the process of language nativisation or indigenisation.

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However, the spatial dimension of language contact and change in each of the above elements is either 'given' or assumed to be merely a context, a backdrop for more detailed inter-personal behavioural studies. As a reaction to this particular conceptualisation of space, a number of geographers have sought to analyze language contact situations from an explicit spatial perspective. And it is in this vein that I would like to address some of the merits of geolinguistic analysis using my home country of Wales as an example.

UNIVARIATE ANALYSIS

Past attempts by geographers at designating language zones in developed multilingual societies are based primarily on the distribution patterns of specific language-speakers as revealed by the decennial census returns, a source which has been especially important for the univariate analyses undertaken in Wales. However, this source is not without its problems, especially if we are concerned with measuring the context of language contact and change. The first problem is that the census cannot cover all the factors involved in language change and yet sweeping generalisations as to the dynamics of culture are often inferred from this source. Secondly, many of the cross-tabulations that would be useful in maintenance studies, such as tabulating language and the work experience, are irrelevant to the census per se and are not completed. The third problem lies in the nature of the question asked. One is asked to declare whether one speaks Welsh and/or English, thus ignoring such facts as change in language dominance, the quality and frequency of language spoken, specific speech domains, and the mixing of speech style. The problem with this data, as with any self-administered mass questionnaire, is that the data is biased by the vagaries inherent in self-reporting, so that the basic material is not rigorous enough for more than aggregate interpretations of the situation.

Nevertheless, the most fundamental task of geolinguistics, the analysis of distribution patterns and spatial structure of languages in contact, has been carried out in Wales for nearly a century. By specifying the spatial variations in Welsh language gains or losses at each decennial count, geographers and others

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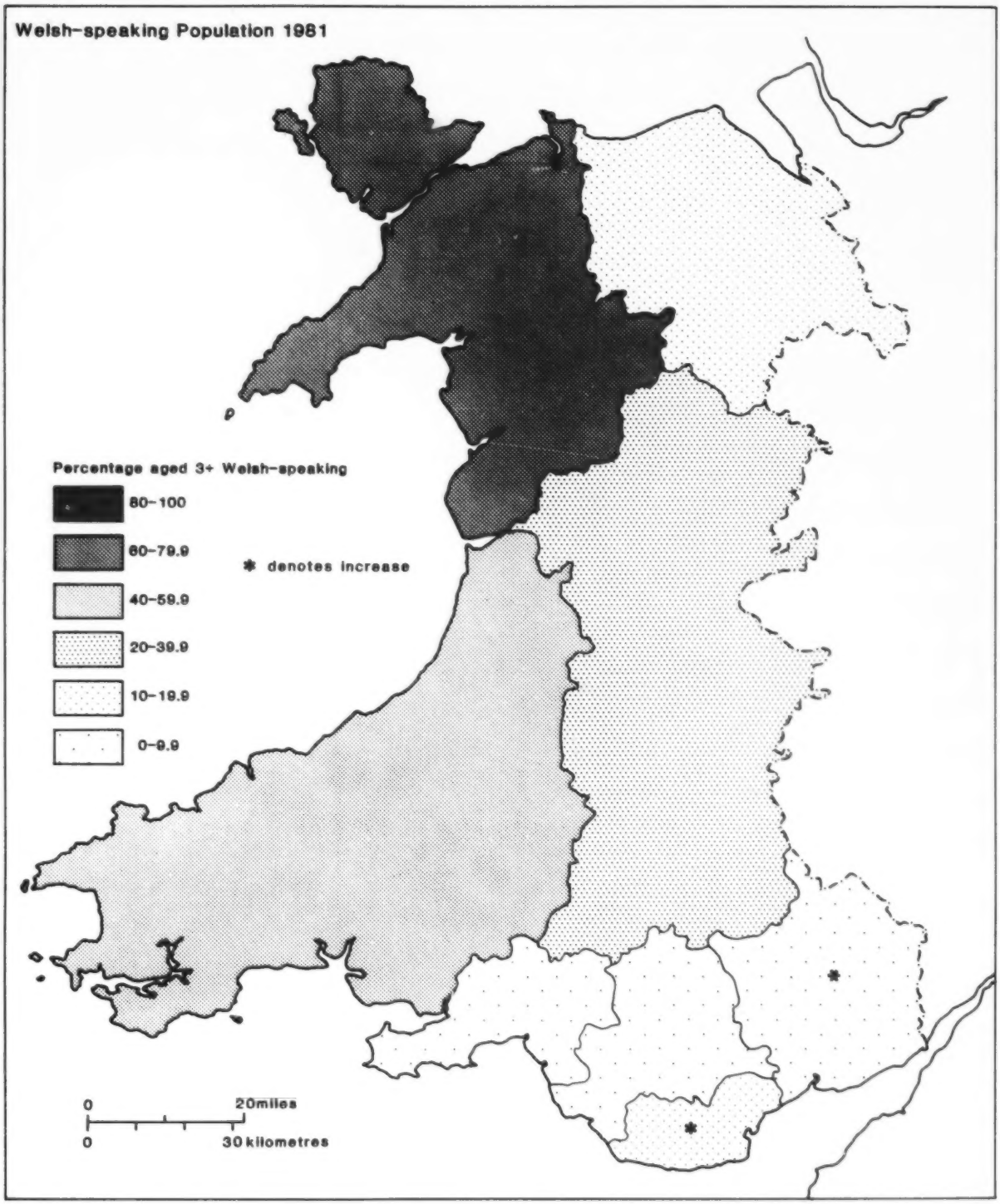

Figure I. Welsh-speaking by county,I98I. Source: Welsh Office data.

have identified consistent elements of Welsh cultural geography, and have reproduced them in cartographic form. The most significant element is the territorial shrinkage of the Welsh-speaking culture region. This, together with decennial variations in the rates of change for each parish, leads one to recognise that although geographical analysis may identify aggregate patterns of language change, it is quite another matter to infer the specific processes contributing to the decline within each constituent region. As Ambrose and Williams have argued at this level of information the national language map (Fig 2) ceases to be simply a means of data presentation and starts to become a tool for analysis.[12] This is most apparent if we add a time element to the parish map and, instead of merely portraying the percentage of parish populations able to speak Welsh, show the extent of change in the proportion of parish populations who can speak Welsh between one census and the next (Fig 3).

For this, geographers have been able to construct zones of language loss or gain variously identified as Inner Wales and Outer Wales (Bowen, 1959), or as a Welsh core, domain and sphere after Meinig's classic essay.[13] The core may be defined as those contiguous parishes where over 70 percent of the population are able to speak the language, the domain, a zone of transition where between 40 and 70 percent speak Welsh, and a periphery (or sphere) where less than 40 percent speak Welsh. Amongst the most interesting features to emerge has been a zone, generally surrounding the 'core area', where the rate of decline has been more rapid than average (ie. over five percent between the 1961 and 1971 censuses). The decline is frequently much more: in seven cases it was more than twenty percent over the ten-year period. This 'zone of collapse', as it has been termed, has been given particular attention, and surveys of attitudes to the Welsh language have indicated that in this zone there is a degree of ambivalence concerning the importance of the survival of the language.[14] Ameliorative measures designed to provide institutional support to Welsh-speakers in such zones of change have been implemented by local authorities. These measures range from the establishment of bilingual schools to the denial of planning applications on the grounds that

certain economic developments might harm the local socio-cultural environment (ie. language balance) in the 'zone of collapse'.[15]

However, it must be admitted that although such measures do take account of patterns of decline, as revealed by geolinguistic analysis, they are for the most part remedial, rather than preventive in character. There are two main reasons for this. The first relates to the politics of the language and Welsh culture, and is heavily influenced by the electoral make-up of each local authority.[16] The second concerns the lack of data on the practice of speaking Welsh as opposed to the mere ability to speak the language. As Ambrose and Williams (1981, p.63) have argued, the numerical collapse in speaking ability is almost certainly the final phase of a gradual weakening of the language's position, earlier stages of which may include a reduced frequency in the reading and writing of Welsh, and a reduced fluency and confidence in its use as an everyday medium of conversation. It could be propsed that the official statistics available represent only the fait accompli of change at the national and regional scale, without allowing the detailed examination of processes which might help to counteract such change; and that by the time numerical patterns reveal that the collapse has reached any particular area, effective counter-measures are already more difficult than they would have been had the problems been recognised much earlier.

All of which leads to the necessity for direct behavioural analysis at the individual scale within the zone of collapse. A geographer's first reaction may well be to employ concepts of space, distance and density to seek answers to a number of questions (Ambrose and Williams, 1981, p.66). Is it the proportional or the absolute numbers of speakers which is more important? Is there a threshold number of speakers necessary to form a viable local speech group? Or does the continuance of the language relate perhaps to some crucial distance or density of speakers? Of course, one must also take into account several socio-structural factors in the local environment, together with considerations such as those of the age, lifestyle, attitudes and perceptions of speakers.

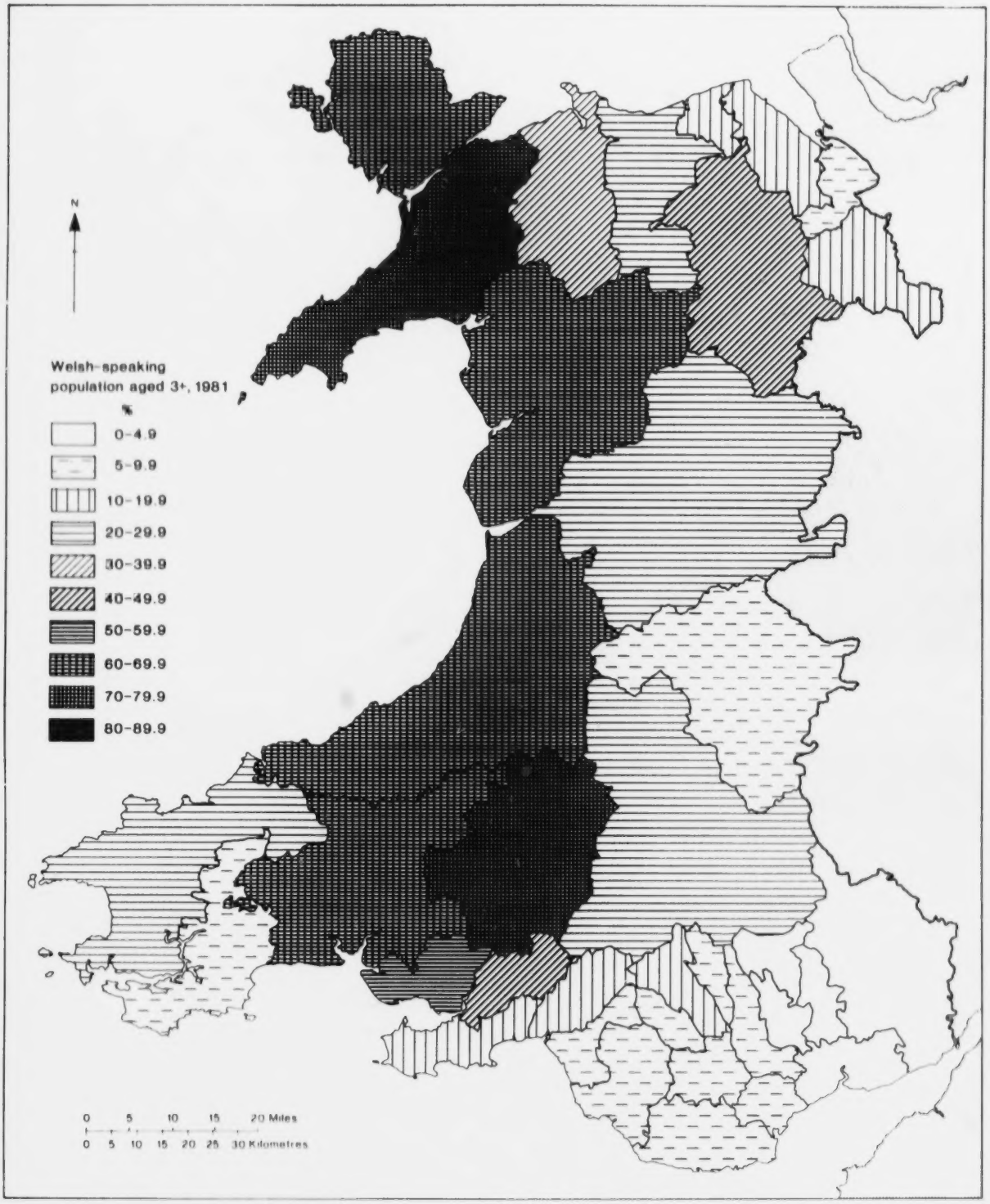

Figure 2. Welsh-speaking population by local authority district, 1981.
(Reproduced with permission from Williams,C.H. "Ideology and the Interpretation of Minority Cultures" Political Geography Quarterly, 1984,3,2,p.118.)

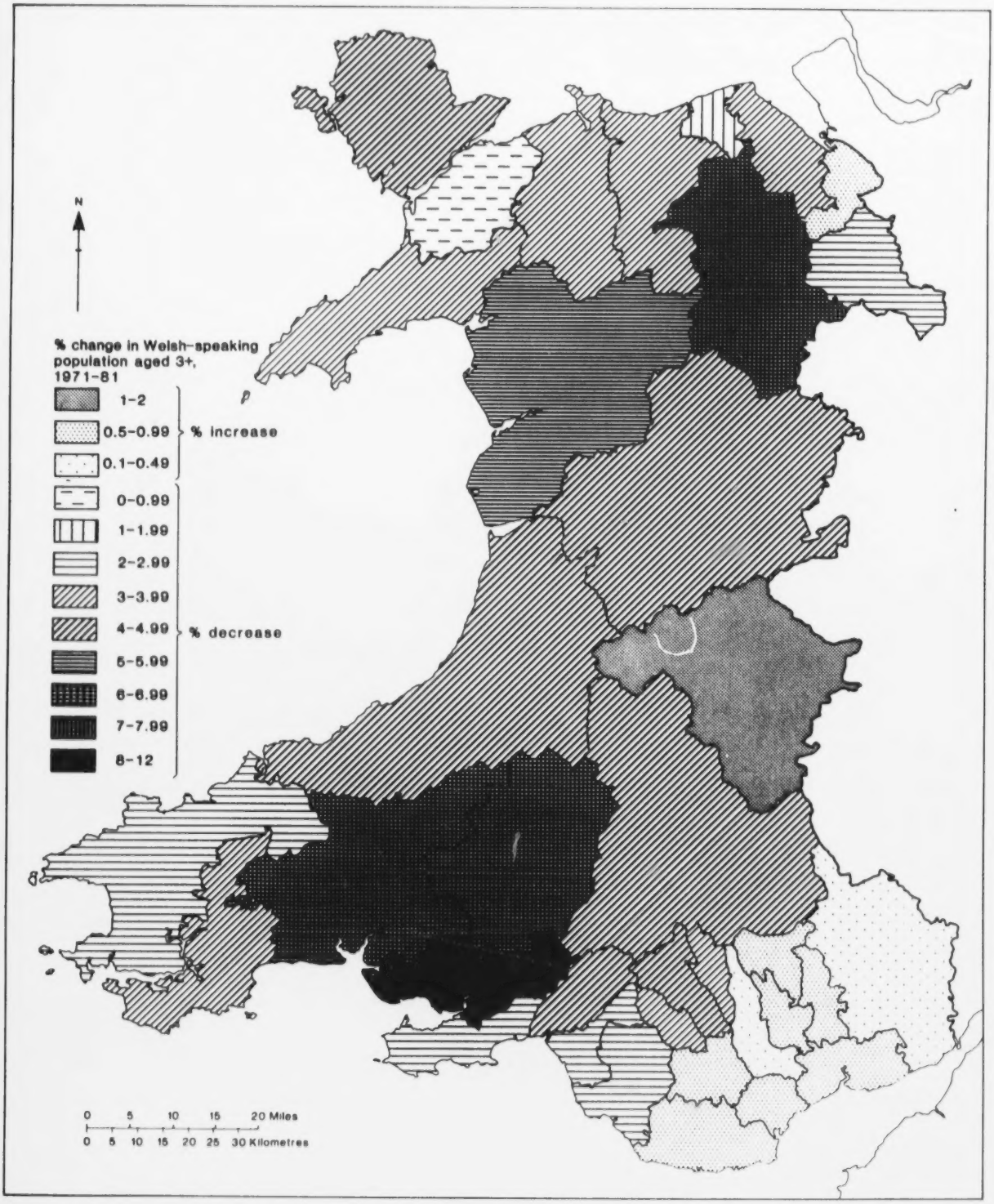

Figure 3. Percentage change in Welsh-speaking population aged 3+ 1971-1981. (Reproduced with permission from Williams,C.H. "Ideology and the Interpretation of Minority Cultures" Political Geography Quarterly, 1984,3,2,p.119).

In an attempt to measure the actual, as opposed to the potential, usage of Welsh in the zone of collapse, Ambrose studied some hundred parishes in the Borderland country of Powys and Clwyd and found that there was no direct correspondence between areas where Welsh speakers form a high proportion of the population and those where the language appears to be used most frequently.[17] At many points where the aggregate census based mapping would suggest fewer than thirty percent of households have a Welsh speaker Ambrose found an unexpectedly high frequency of use, apparently spontaneously generated in an area where the language might be presumed to be in acute decline. Furthermore he found evidence that each major activity of daily life produced its own spatial and social pattern of language use, alerting us to fallacy of generalising from either the census source or a few salient contexts where interlocators may be examined in detail.[18]

The attempt to draw and re-draw the patterns of language potential and practice at varying scales alerts us to the fact that whether Welsh is or is not a minority language in any area varies according to the scale at which observation has been made. In any event the fact that the language is in a numerical minority may not be particularly significant, since Ambrose and William's evidence (1981, p.70) has shown that the language is not necessarily 'safe' in places where over eighty percent of people can speak it, and that it is not necessarily 'dead' or 'lost' where only ten percent can do so.

The census is an important data source for geolinguistic analysis, and one which I contend is often either under used or over stretched depending upon which arguement is being formulated. Conclusions based upon univariate analyses of language change often ask their one data source to do too much, and grandiose processes are constructed from a limited set of language related questions asked but once per decade. Without the addition of detailed empirical work undertaken in many and varied contexts throughout Wales our knowledge of the actual linguistics and social features underpinning change would be scanty indeed.

However, the census source is often underused also, because of our reticence to

incorporate significant non-linguistic data, such as population change, economic growth and levels of urbanization, in tandem with the specific linguistic data in order to provide a more comprehensive account of the fortunes of a minority language such as Welsh. Too often in the past, linguists have assumed, and not specified, the socio-economic context within which their studies are undertaken. Also the results of research undertaken in bilingual and multicultural societies have often been accepted and repeated without any regard for the question of place. Thus 'where' in Wales one conducts a survey relating to the language of education, or of local government is of profound significance as it will partly determine the results obtained. One might confidently predict that attitudes to Welsh will be far more favourable in Gwynedd, than in Gwent or in South Pembroke. And yet, all too frequently sociolinguists and others have failed to take into account the influence of location, and thus accept results which a lay person familiar with the situation would treat in a more cautious manner.[19]

Now the relationship between context and behaviour is an old chestnut, which I do not propose to discuss in a causal fashion here. Except to say that in aggregate terms geographers may provide a set of socio-economic patterns of change which could inform linguistic analysis. These might be concerned with macro-level theorising on language decline/growth, the spread of bilingualism, or the structural conditions which favour the development of one language group vis à vis others.

Multivariate Analysis

One means of contributing to our understanding of language change is through ecological analysis. In the early 'seventies concern was expressed that geographers inferred quite complex social behaviour from the distribution patterns derived from language mapping. Two problems of univariate analysis presented themselved in this context. First, by reducing a culture complex to its most tangible expression, in this case, language, much else that was valuable and informative was lost or ignored. Secondly, the culture areas which were often delimited from census-based language studies, illustrated quite classic examples

of the pitfalls of inferring temporal processes from maps. Such culture areas, as Hudson has reminded us, tend to take on a life of their own, their boundaries serving to bound the social existence of their inhabitants.[20] Geographic factors, such as diffusion, location, language zones and frontiers of inter-cultural penetration were often cited as if they were the key explanatory features rather than being part of the total socio-linguistic structure. As a reaction to these criticisms cultural geographers began to use the fast growing array of multivariate techniques and an example of its potential for geolinguistic analysis is now presented.

In order to provide a more satisfactory understanding of the Welsh language in the agregate an ecological analysis was undertaken. This would aid both in the description of the variables underlying spatial variations in culture change, and also demonstrate that the geographic localization of a culture complex was itself an important socio-stuctural phenomenon, because it created distinct socio-cultural environments which are hypothesized as influencing language attitudes and behaviour.

Data on forty eight variables were calculated for the 168 Local Authority units existent in Wales prior to 1974 Local Government regorganization (Table I). Thirty of these variables were derived from the national census of 1971. Eight voting behaviour variables were derived from the published results of general elections held in 1966 and 1970, the two primary indicators of party choice closest to the census date. The other political variables were the incidence of Plaid Cymru branches and Welsh Language Society cells per 1,000 population. As with the electoral data, the party and Language Society data was transformed from constituency to local authority units. The final group of variables relate to the educational and religious characteristics of Welsh areas. It was intended that the inclusion of additional data on voting, religion and education would provide a more meaningful differentiation of Welsh regions than had hitherto been accomplished by research dependent on the census source alone. This data set was then examined using a principal components analysis wherein sixty-two percent of

Table 4 1971 Principal Components Analysis with Varimax Rotation of 7 Components

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*
1. Soc. Class 1	+	0.579	–	–	–	–	–
2. Soc. Class 5	–	–	+	+	+	+	+
3. Employed total	–	–	+	+	–	+	+
4. Pers < 4	–	+	+	0.817	+	–	+
5. Pers 5 – 14	–	–	–	0.761	+	+	–
6. Pers 15 – 24	–	+	+	+	+	–	0.653
7. Pers 25 – 44	–	+	+	0.805	–	–	–
8. Pers 45 – 64	+	–	+	– 0.556	–	+	–
9. Pers > 65	+	+	–	– 0.742	–	+	–
10. Owner occupied	+	+	+	–	–	–	– 0.759
11. P. rent. unfurnished	+	– 0.470	– 0.603	–	+	–	–
12. P. rent. furnished	+	+	–	–	0.507	–	+
13. Loc. Auth. housing	–	+	+	0.443	–	+	0.625
14. Basic amenities	–	0.772	–	+	+	+	+
15. Water closet	–	0.862	–	+	+	+	+
16. No bath	+	– 0.643	–	+	–	+	
17. Car owner	+	+	– 0.531	+	+	–	
18. Pers. p. room	–	–	+	0.744	–	–	+
19. Pop. change	–	0.702	–	0.449	+	–	–
20. Anglican	+	–	– 0.575	–	+	–	
21. Catholic	–	0.439	+	+	–	+	
22. Nonconformist	0.621	–	–	–	–	+	
23. W. Nonconformist	0.765	–	–	–	–	+	
24. Welsh 3 – 15	0.813	+	–	–	+	+	+
25. Welsh 65	0.829	+	–	–	+	–	+
26. Welsh + English	0.914	–	–	–	+	+	
27. Int. Cens. language	–	+	–	+	–	+	
28. Pop. read. Welsh	0.918	–	–	–	+	+	
29. Pop. write Welsh	0.903	–	–	–	+	+	
30. Plaid 1966	0.743	–	–	–	+	+	+

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*
31. Liberals 1966	0.443	–	– 0.512	–	–	+	+
32. Labour 1966	–	–	0.771	+	–	–	–
33. Conservatives 1966	– 0.487	0.404	– 0.492	–	+	+	–
34. Plaid 1970	0.831	–	+	–	+	–	+
35. Liberals 1970	+	–	– 0.641	–	–	+	+
36. Labour 1970	–	–	0.797	+	–	–	–
37. Conservatives 1970	– 0.440	0.444	– 0.521	+	+	+	–
38. Urdd centres	0.603	–	–	–	–	+	–
39. Plaid branches	0.561	–	–	–	–	+	
40. Nursery schools	+	+	–	–	+	0.599	
41. Welsh schools	0.700	–	–	+	+		
42. W.L.S. cells	+	+	–	–		0.587	+
43. Aelwyd branches	0.648	–	–	+	–	+	
44. Unemployed	+	–	–	+	–	+	–
45. Female employed	–	+	+	–	–	+	+
46. Males, in agriculture	+	– 0.417	– 0.679	+	–	–	–
47. Males, unskilled	+	–	+	+	0.909	+	
48. Males, professional	+	–	+	+	0.919	+	
Variance	19.06	8.83	10.53	10.05	4.98	4.65	4.41
Cumulative V.	19.06	27.89	38.42	48.48	53.47	58.12	62.54
Eigen values	9.149	4.240	5.055	4.826	2.393	2.233	2.119

Source : Williams,C.H. ed.,1982,pp.168-69.

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the estimated variance in the set of forty eight variables was accounted for by seven components with eigen values greater than 1.5. The results of this primary solution were considered to be too general for precise interpretation, consequently a varimax rotation was adopted producing the following results as indicated in table 1.

The first component summarized 19.06 of the data variance to form a Welsh 'ethnic' component. Three variables correlate over 0.9 namely the percentage able to speak both English and Welsh (variable 26) and the percentage able to read (variable 28) and write (variable 29) Welsh. These language skills are strongly associated with non conformist religious adherence and with Plaid Cymru's organisational network and popular support at the 1970 general election. Additionally several other culture reinforcing institutional features are picked out by the leading component, viz. Welsh junior schools, Urdd youth centres and Aelwyd adult centres. At the negative end of the scale we have a medium loading showing the stability of the Conservative vote at both the 1966 and 1970 election. Historically, the Conservative Party has been interpreted as a political organization reflecting class interests alien to the mass of the rural Welsh electorate, and as an agent for constitutional consolidation brought about by the inexorable anglicization of Wales. This first component might be said to summarize a politico-cultural antipathy between a radical Welsh-speaking Wales and a conformist Anglo-Welsh identity.

For the geographer, this methodology holds the additional interpretive advantage that the Local Authority scores for each component may be mapped to produce interesting spatial patterns. Figure 4 confirms the long-established tripartite pattern of core, domain and periphery. The Welsh core may be described by those districts scoring over +1.0 Standard Deviation, the domain by those districts scoring between $\pm$ 1.0 S.D. either side of the mean, and the periphery by those districts falling below -1.0 S.D. on figure 4. The three leading nodes of Bala, Penllyn and Gwyrfai R.D. express the epitomy of a Welsh-speaking, radical and non-conformist area. However, the traditional solid core area (c.f. figure I) is

bifurcated with two complimentary Welsh culture regions centered in the north on Llŷn and Merioneth, and on Cardiganshire and Carmarthenshire in the south. The intervening region of north Cardigan and Machynlleth is not any less Welsh in terms of the proportion of Welsh-speakers. Its distinctiveness here, relates to the relative sparcity of Welsh-medium schools and the decline of radical voting, especially Liberal, by the 1970 general election. This is an important shift in political emphasis and provides additional internal variation within the core, which has often been treated as an undifferentiated culture region.

The analysis, thus far, has suggested a close social and spatial relationship between language, religion and radicalism. However, not all the core area, as traditionally defined, has been described by scores over +1.5 S.D. The most striking exception is Anglesey.[21] This county has long been prominent in Welsh affairs, but the evidence of this and previous (1961) analyses suggest that the island is gradually differentiating itself from the core region. Although the ability to speak Welsh is as high as elsewhere in the core (eg. figure 1) ethnic institutional support factors are not as prominent here, in that Anglesey's educational, religious and political characteristics are more akin to the Welsh average than they are to the core region. It will be interesting to see whether the drift identified since 1961 will continue and whether Anglesey's socio-cultural environments will prove as capable of reinforcing Welsh language dominance in the remaining decades of this century.

The local authority districts which cluster either side of the mean may be likened to Meinig's domain concept. This is an area which, until recently, was dominated by the indigenous culture, but with less intensity and homogeneity than the core. Given their higher scores the northern districts appear to be better able to withstand cultural encroachment. The southern coalfield districts of the domain have suffered acute decline since the 1961 analysis. By 1971 only pockets of distinctiveness remain, as at Aberdare, Caerffili and Pontardawe, where there are strong Welsh junior schools, above average concentration of Welsh speakers and whose Nationalist support is well above average for industrial South Wales.

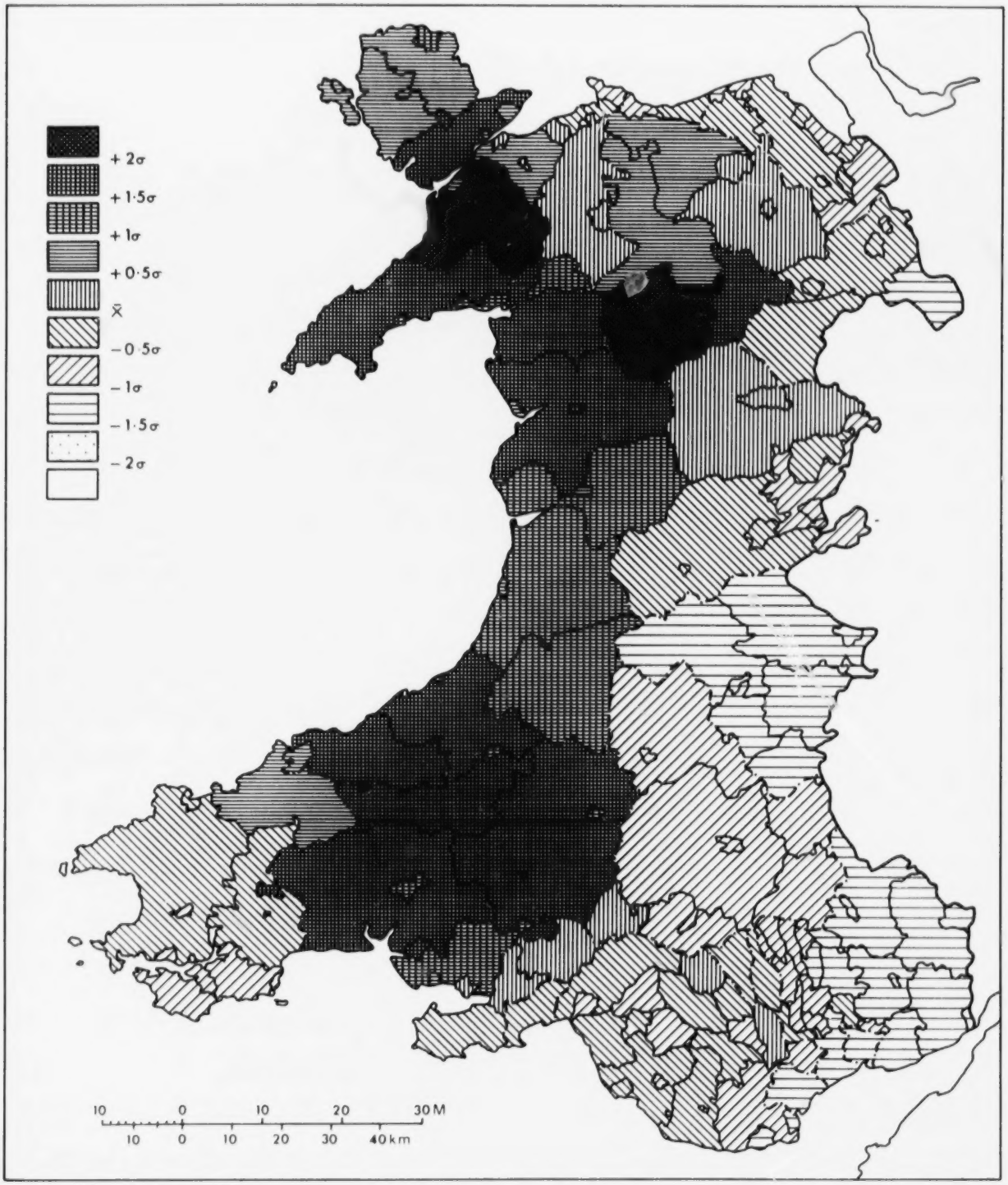

Figure 4. Principal Components Analysis, component one,1971.
(Reproduced with permission from Williams,C.H. ed National Separatism,1982,p.171).

The periphery (ie. below - 0.5 S.D.), where Welsh culture traits are weakest, is comprised of four areas : 1) the North Wales coastline where tourism and retirement functions have increased dramatically since 1945 and contributed to anglicization, 2) the border country of Brecon, Radnor and Monmouth which have long been anglicized since Tudor times; 3) South Pembrokeshire, "Little England Beyond Wales," an English enclave since the sixteenth century, and 4) the Severn coastal plain comprising the major urban-industrial corridor of Newport, Cardiff, Penarth and Barry. These are the areas where in proportional terms the Welsh language and radical voting is weakest and where the largest religious system is the Anglican Church, followed by English Nonconformists and Catholics, a feature typical of many urban areas. Despite their position at the polar extreme from the core, these areas are significant as the locales of Local Authorities who have attempted to strengthen Welsh at all levels in the education system with some creditable success. In rural areas the periphery is in the process of becoming more uniform. This is due in part to the immigration of unilingual English-speakers, to the general decline of an aged Welsh-speaking population, and to a general increase in support for the Tory party. Despite this overall pattern one notable feature of Welsh cultural geography remains, the Carmarthenshire/Brecknockshire and Cardiganshire/Radnorshire border interface, which continues to be a distinctive zone where core and periphery adjoin.

For the purpose of the present arguement we need not detail the remaining components in like fashion, but merely highlight their chief characteristics and indicate how they underpin our central concern with language. The second component distinguishes variations in housing quality along a rural-urban dimension. The highest conrrelations are positive and indicate associations between households having exclusive use of a water closet and all basic amenities (variables 15 and 14), males in social class 1 (variable 1), population change (variable 19), Conservative support (variables 33 and 37), and the distribution of Catholics in Wales (variable 21). Negative correlations associate households without a fixed bath (variable 16), the percentage of people living in rented unfurnished

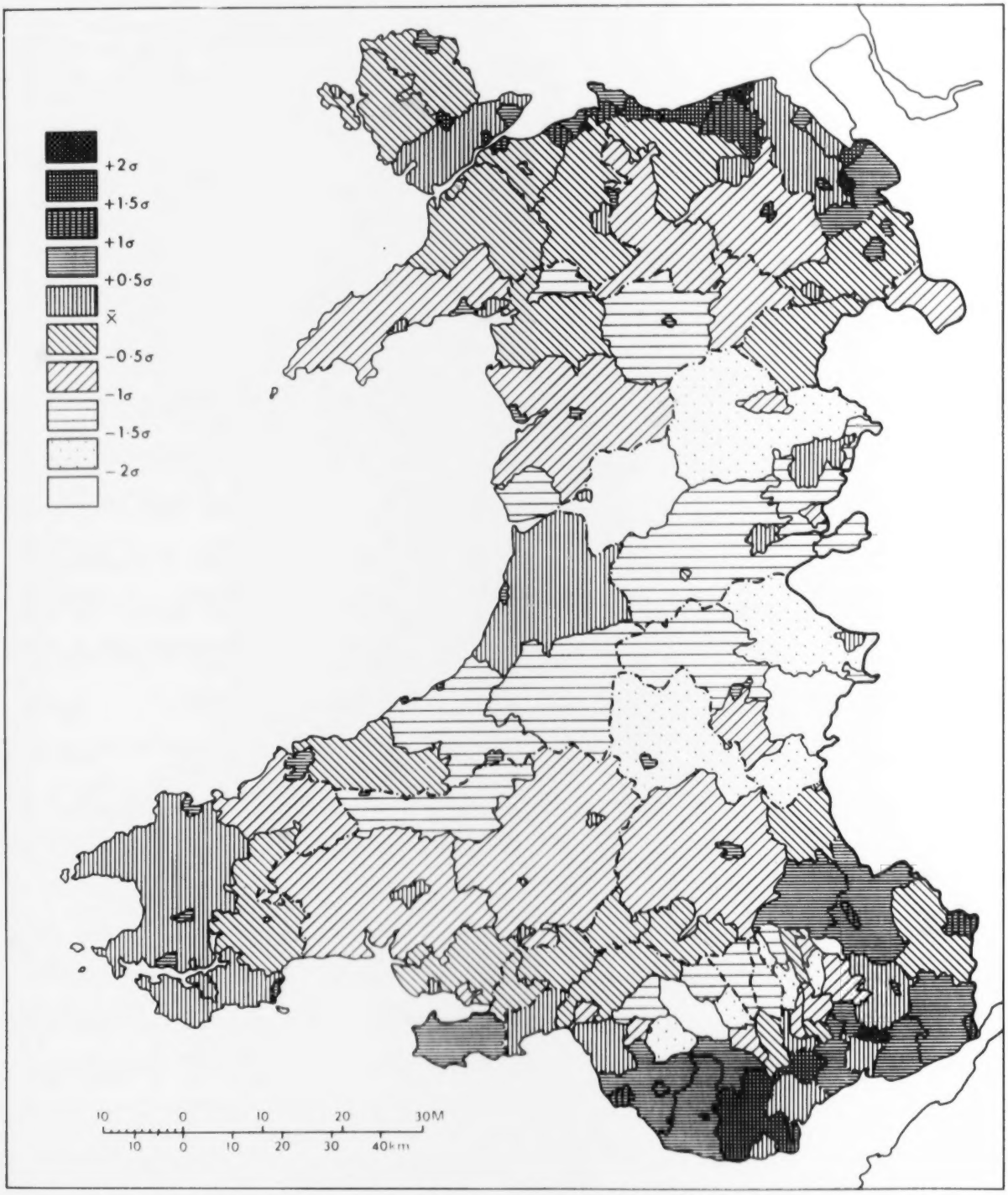

Figure 5. Principal Components Analysis,component two,1971.
(Reproduced with permission from Williams,C.H. ed National Separatism,1982,p.173).

accommodation (variable 11) and the percentage males employed in agriculture (variable 46). This component explained some 8.83 percent of the total variance.

The spatial expression of component two (figure 5) identifies the good quality housing areas which have high proportions of males in social class 1 and have experienced population growth in the decade. These are located in two distinct Anglicized zones, the North Wales coastal belt from Bangor to Rhyl and the south-eastern suburban fringes of Newport and Cardiff. These are the traditional strongholds of conservatism where the language has been weakest and immigration, to the steadily diversifying economic base, strongest.[22] At the other end of the scale we may identify two regions suffering acute social deprivation. The first is the special problem region of Mid-Wales, which extends from Carmarthen R.D. in the south to Hiraethog R.D. in the north. These areas (which score below -0.5 S.D. on Figure 5) are characterized by poor housing, high rates of outmigration, a bottom heavy class structure, and high rates of males employed in agriculture. The region has suffered an acute post-war decline which has had serious effects on any attempt to maintain viable communities, and increases the fiscal burden of providing appropriate transport, educational, social and medical facilities in these sparsely populated areas. In this region the current malaise of economic marginality and cultural fragmentation has translated itself into ready arguments by Nationalists of Westminster mis-rule, and neglect.

Yet, an out-moded infra-structure and sub-standard housing is not a rural perogative. A second major region of social deprivation exists in the central and eastern parts of the southern coalfield. Figure 5 reveals that urban-industrial decay is particularly acute in the Rhondda and in Blaenavon, both amongst the earliest communities to experience industrialization. Much of the housing stock, being over a hundred years old, is devoid of many basic amenities, whilst the valley populations have experienced high rates of outmigration, particularly of the occupationally mobile , the young and the well-educated. It is no exaggeration to suggest that this is the region which has suffered most in the de-industrialization of the post-war Welsh economy.

Despite the similarity of Mid-Wales and the mining valleys in terms of depopulation and infra-structural decay, they look to different parties and ideologies for solutions to their shared problems. The third component (figure 6) reflects the marked regional variation in traditional political support which has divided Wales since the nineteen twenties. It contrasts the strong positive loadings of Labour voting patterns at the 1966 and 1970 general elections (variables 32 and 36), with the negative associations of agricultural employment (variables 46), private rented unfurnished accommodation (variable 11), high rates of Anglican adherence (variable 20), above average rates of car ownership (variable 17) and support for the Conservatives and Liberals (variables 33 and 37, 31 and 35). The spatial pattern of this dimension indicates that the Labour Party's strength is still concentrated in the industrial communities of the South, marking out the coalfield region as the most visible expression of Labour's hegemonic position almost anywhere in Britain. As befits the largest Welsh Parliamentary party Labour's support is also significant in the Deeside sub-region and in the urban centres of Gwynedd. Since 1961 a number of changes in party support have made mid-Wales a more interesting political region than hitherto. In general the decline of Liberal support in the region has resulted in an increase in Welsh Nationalist support in Welsh-speaking constituencies, whilst in predominantly English-speaking areas it favours a growth in the Tory vote at general elections.

The fourth component adds a demographic dimension to the analysis. The positive loadings associate a predominantly youthful age structure (variables 4, 5 and 7), the density of persons per room (variable 18), intercensal population change (variable 19) and Local Authority housing (variable 13). At the other end of the scale high negative loadings indicate a predominantly aged population (variables 8 and 9). It is clear that demographic considerations are vital to any geolinguistic analysis. These considerations relate both to the rates of population change, such as total numbers, birth rate, death rate, immigration and emigration rates, age structure and sex ratio, and to the distribution aspects of these rates. Thus one would need to know the extent to which respective language groups

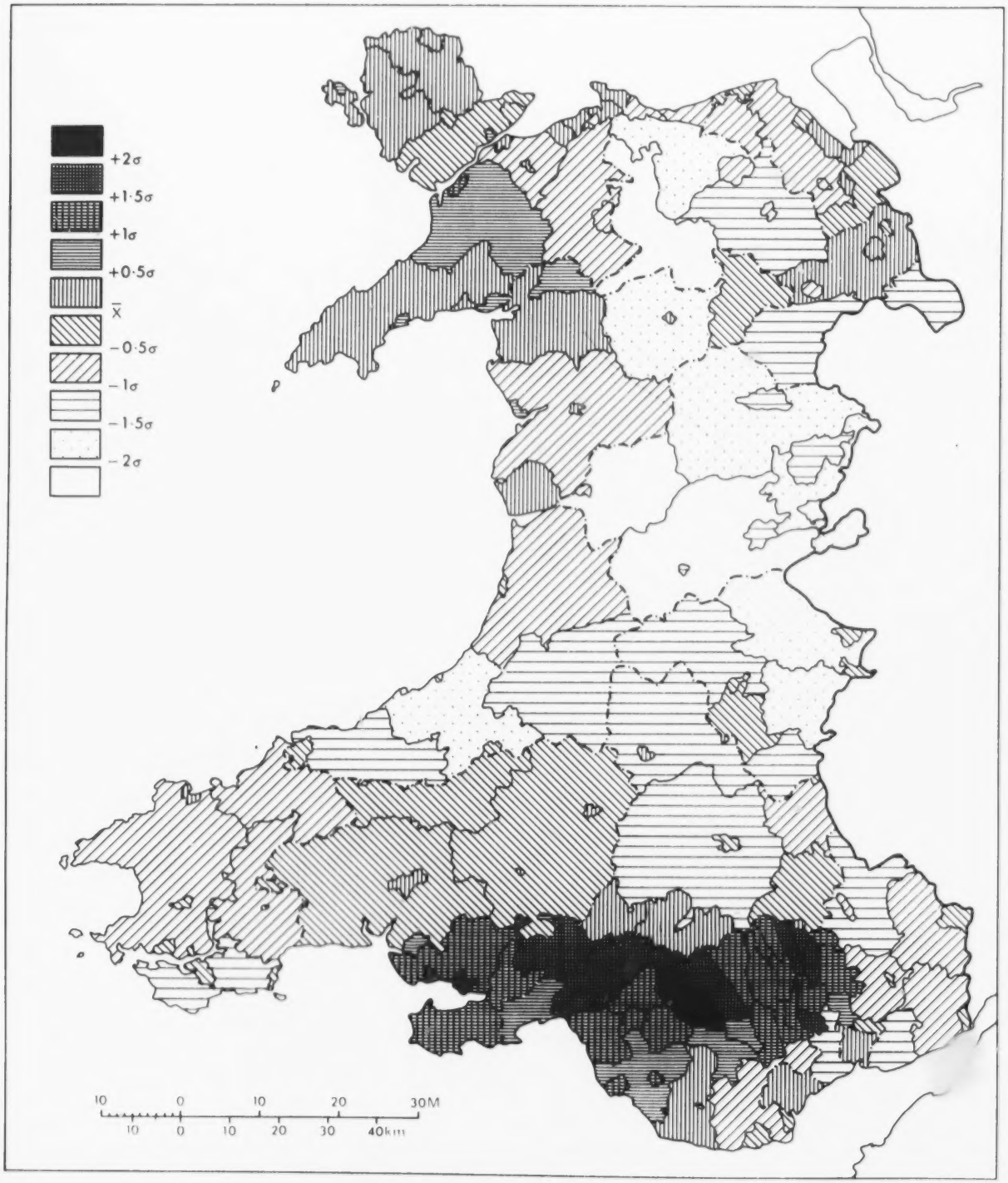

Figure 6. Principal Components Analysis,component three,1971.
(Reproduced with permission from Williams,C.H. ed National Separatism,1982,p.176).

are concentrated or dispersed, integrated or segregated, predominantly rural or urban and over how much of a specific territory they form a numerical majority.

This component highlights two areas in Wales which express a high incidence of young people, areas which have experienced population growth have a high density of occupance and a fair representation of Local Authority controlled housing. The first such region, evidenced on Figure [7] with rates over 1.05 S.D., is the surburban coastal belt of the industrial south-east focussed on the hinterland of Cardiff, Newport and Barry. Part of the explanation relates to urban overspill as the newer housing stock is located in predominantly ex-urban sites on cheaper land, somewhat removed from the centres of trade and industry. Part also is a direct consequence of regional planning having established quasi new towns in the region at Cwmbran, Llantrisant and high technology industrial parks at Bridgend, Caerffili and Caldicot. In an ailing economy these are the designated areas of growth, consequently they attract both private and public capital in housing development for employees at the new capital investment projects, such as the Royal Mint at Llantrisant, Ford and Sony at Bridgend. Interestingly enough these are also some of the areas where significant advances have been made in the provision of Welsh medium educational establishments. It was in the economically active southern periphery that pressure for Welsh language promotion took place, and not, as might have been expected, in the northern core where the language was an established element of communal life.

A second growth area is Anglesey. It is the only predominantly Welsh-speaking county which has a predominantly youthful population structure, reflective of the increased employment generated by massive investment in the power industry and oil industry. During the past decade, 1961-71, Anglesey experienced a substantial decline in its proportion of Welsh-speakers, with Beaumaris and parts of Twrcelyn suffering a decrease over 20% in the decade. Although accounting for only 6.84 percent of total Welsh speakers, Anglesey is one of the traditional cores of Welsh speech, where many of its inland parishes contain over eighty percent Welsh speakers. And yet the total population speaking Welsh remained constant

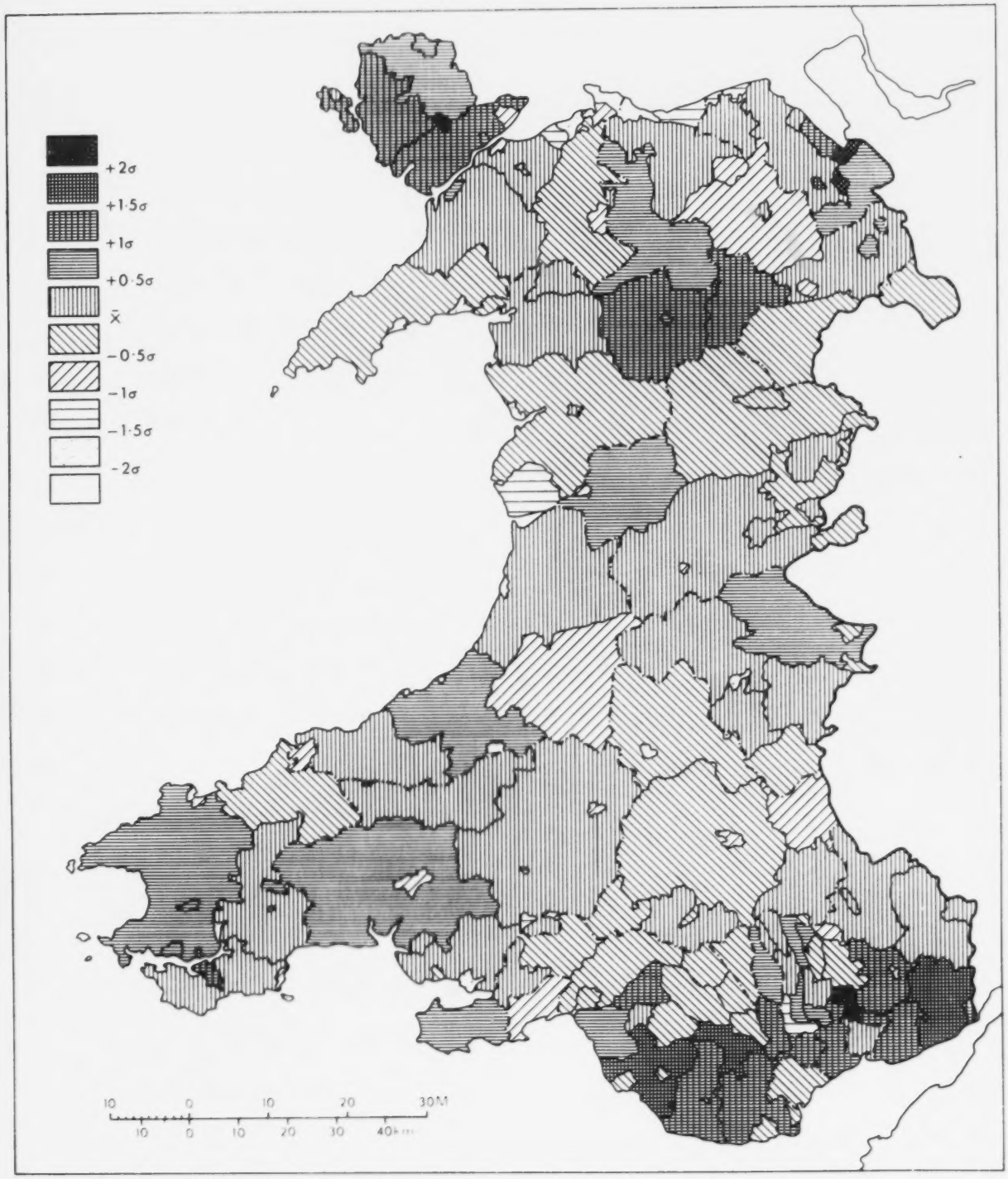

Figure 7. Principal Components Analysis, component four, 1971.

over a decade at 37,100. The proportionate decline was due to immigration, such that Anglesey showed the highest increase in the proportion of people born outside Wales during the decade. These changes were induced by industrial expansion in the oil and nuclear power industries. Initially this attracted temporary construction workers as new plant was being erected, subsequently permanent employees took up residence on the island to operate these industrial plants. In the main these capital intensive projects attracted a new professional class of managers, research scientists and technocrats.

APPLICATIONS

Let me conclude by stressing two themes which I think would be advanced by a greater input from the type of geolinguistic analysis identified above. The first is the use of multivariate regional analysis as a sampling framework for linguistic and attitudinal studies. There is great potential here for selecting representative sample sites based upon a broad knowledge of the operating socio-structural factors. Thus if one were interested in examining the phonology of Welsh, or in accental variations of consonants and vowels, it would aid analysis if the subject's background were placed within a wider socio-cultural context.[23] One could then determine, as far as possible, which phonological features were characteristic of specific regions. Apart from a general interest in language development, such knowledge might be critical in, for example, the field of Speech Pathology and Therapeutics. It is vital, as Ball and Munro show, that regionally variant pronounciations are acknowledged, and not confused with delayed or deviant forms. They provide the following brief examples of possible accental forms which would "include the loss of /h/ in certain southern (Welsh) pronounciations (linked with /$\underset{\delta}{r}$/→/r/; the devoicing of medial stops (also a southern feature); and the realisations of initials /xw/ ... (x^w) in North Wales, (hw) in Mid Wales and (w) in South Wales).[24] Such information, if standardised, could be used as a data base from which one could exmaine the phonological processes which link child and adult realisations in different parts of Wales.

A related and more familiar use for geolinguistic analysis would be in the selection of sample sites for behavioural studies, as in assessing the influence of the socio-cultural environment on attitudes in multilingual settings.[25] Social psychologists have recently acknowledged, what social and cultural geographers have practised for years, the need for the integration of behavioural and ecological results. Thus Price et al[26] concluded a review of attitude studies with the following remarks which I wholly endorse having attempted this difficult task in the past.[27] "Finally, this study does point to the dire need for interdisciplinary, programmatic research in a number of cultures simultaneously on language attitudes. We desperately require developmental, langitudinal studies to be carried out over a long time span with different subgroups and in different regions of country or state. To this end, we not only need ..... a clearer theoretical and empirical understanding of the cognitive mechanisms involved in the social evaluation of language varieties ..... but we (also) require a cogent analysis of the wider sociostructural and ideological factors operating in the communities in which the studies are conducted using both matched-guise techniques and direct questionnaire methods."[28] This is an especially important area of enquiry as government social policy is increasingly predicated on referenda and on opinion surveys at local and national level.

A geolinguistic analysis may also prove useful in language status planning. In industrialized multilingual societies which honour the rights of their linguistic minorities, the population which is to be educated, taxed, governed and informed through its own language, must be precisely enumerated for effective control. The fulfillment of the state's obligation in spheres such as bilingual euducation, local government transactions and juridical matters often involves a territorial component, because the target population is itself most often regionally concentrated. In such cases, geolinguistics may prove relevant in three ways. First, as we have seen, it may be used to collect specific data relating to the demographic, occupational, political and religious characteristics of the constituent linguistic groups by region. Secondly, if language planning

policies advocate the territorial as opposed to the personality principle of satisfying the linguistic rights of citizens, this will involve a spatial component to government action. Whether this be a formal acknowledgement, as in the case of Finland and Canada's bilingual districts programmes or an informal recognition without the consequent legal provisos, as in the case of contemporary Wales, there nevertheless remains the problem of identifying the appropriate boundaries of the spatially defined lanugage groups.[29] Various techniques and approaches have been developed to satisfy these problems and minimise inter-ethnic antagonism, but the practical application of language planning in this field is characterised more by conflict than harmony in most countries. The third role for geolinguistic analysis is in the siting of key institutions and facilities to provide government services. In planning terms it is critical to know where to site a bilingual courthouse, or a bilingual university college or even a bilingual governmental assembly. Geolinguistic research could provide data to inform such political decisions by generating alternative patterns indicating the minimum and maximum potential use of such facilities, the thresholds of population within given radii of key institutions, normal travel to work data, etc. Its most frequent contribution in Wales to date has been in delimiting alternative catchment areas for proposed bilingual high schools, and further educational establishments. Such functions are linked to the whole complex of language and social rights and are therefore subject to political controversy. But in societies where language minorities wish to remain different from the majority ethnic group, this is to be expected.

CONCLUSION

I have offered only a brief sketch of the potential of geolinguistic analysis and its application in one case study. But I am convinced that as we seek for more practical solutions to our time-honoured problems in multilingual societies, we will turn increasingly towards the socio-eocnomic planning of language. Now this may disappoint free thinkers and romantics alike who may believe that the 'spirit of the tongue' is being quenched by formal planning.

It may also anger sceptics who believe that an inordinate amount of time and expense has been wasted on the "propping up" of dead or declining languages. But, so long as we value language as the expression of a unique identity and of a right to being, so long will we need to incorporate, and not divorce, the needs of that language within its wider socio-economic and political domain. If geolinguistic research quickens our awareness of the totality of language functions within a specific realm of the earth, it will have contributed something of value to our understanding of both when and where language may speak to us, and we in turn, to one another.

Notes

1. This paper is a revised version of a lecture delivered at Syracuse University, 7th April 1983. The research reported on here was supported in part by a grant from the British Academy which I warmly acknowledge.

2. See the aims of the American Society of Geolinguistics, founded in 1965, which are in turn delivered from Mario Pei 's section on geolinguistics in his Invitation to Linguistics (Southbend, IN : Gateway Ed, 1971).

3. F. Lukerman, "The 'calcul des probabilities' and the Ecole Francaise de Geographie," The Canadian Geographer,' 9 (1965): 128-37.

4. W.T.R. Pryce, "The Idea of Culture in Human Geography," in E. Grant and P. Newby (eds.) Landscape and Industry (Middlesex Polytechnic : Faculty of Social Science Publication, 1982): 131-49.

5. For a bibliographic review of this field see C.H. Williams, "The Geography of Language in Wales," Discussion Papers in Geolinguistics 4 (1981).

6. See amongst others H. Wagner (eds.) Linguistic Atlas and Survey of Irish Dialects (Dublin, D.I.A.S., 1964); H.R. Thomas, The Linguistic Geography of Wales (Cardiff, University of Wales Press, 1973), Ibid; Areal Analysis of Dialect Data by Computer : A Welsh Example (Cardiff, University of Wales Press, 1980); J.K. Chambers and P. Trudgill, Dialectology (Cambridge University Press, 1980). For Elucidation of the variable rule see J.K. Chambers, "Geolinguistics of a Variable Rule" Discussion Papers in Geolinguistics, No. 5 (1981).

7. W.K. Mackey, Three Concepts for Geolinguistics (Quebec City, C.I.R.B., 1973); Ibid., "The Ecology of Language Shift" in P.H. Nelde (ed.), Sprachkontakt and Sprachkonflikt (Wiesbaden, Franz Steiner, 1980, pp 35-41., Ibid, "Geolinguistique et scholarisation bilingue," Etudes de linguistique appliquee, 15 (1974), pp 10-33.

8. K.W. Deutsch, Nationalism and Social Communication (Cambridge, Mass : MIT Press, 1966); D. Lerner, The Passing of Traditional Society (New York: Free Press, 1964). C.H. Williams, "Social Mobilization and Nationalism in Multicultural Societies, "Ethnic and Racial Studies, 5, 3, (1983), pp. 349-65.

9. The best recent summary of this work is B. Weinstein, The Civic Tongue: Political Consequences of Language Choices (New York: Longman, 1983); see also S. Rokkan and D.W. Urwin (eds.) The Politics of Territorial Identity (London : Sage, 1982).

10. W. Labov, Language in the Inner City : Studies in Black English Vernacular (Philadelphia : University of Pennsylvania Press, 1972); L. Milroy, Language and Social Networks (London: Basil Blackwell, 1980).

11. Two journals which cover these applied aspects are Language Problems and Language Planning, and The Journal of Multilingual and Multicultural Development.

12. J. Ambrose and C.H. Williams, "On the Spatial Definition of Minority," in E. Haugen, et al. (eds.,), Minority Languages Today (Edinburgh: Edinburgh University Press, 1981) pp. 53-71.

13. See E.G. Bowen "Le Pays de Galles," Trans of the Institute of British Geographers 26, 1959, pp. 1-23; D.W. Meinig, Imperial Texas (Austin: University of Texas Press, 1969) esp pp.110-118; W.T.R. Pryce, "Wales as a CultureRegion," Trans Honourable Society of Cymmrodorion, 1978, pp. 229-61; C.H. Williams, " An Ecological and Behavioural Analysis of Ethnolinguistic Change in Wales," in H. Giles and B. Saint-Jaques (eds) Language and Ethnic Relations (Oxford: Pergamon Press, 1979)pp. 27-56; H. Carter and J.G. Thomas, "The Referendum on the Sunday Opening of Licensed Premises in Wales as a Criterion of a Culture Region," Regional Studies, 3 (1969), pp. 61-71.

14. C.J. Thomas and C.H. Williams, "A Behavioural Approach to the Study of Linguistic Decline and Nationalist Resurgence: A Case Study of the Attitudes of Sixth-Formers in Wales," (Part 1), Cambria, 3, (1976), pp. 102-24; (Part 2) Cambria, 4, (1977), pp.152-73.

15. C.H. Williams, "Language Planning and Minority Group Rights," Cambria, 9, (1982) pp.

16. For details see K.O. Morgan, Rebirth of a Nation: Wales 1880-1980, (Oxford : Oxford University Press, 1981); D. Balsom and M. Burch, A Political and Electoral Handbook for Wales, (Farnborough: Gower, 1980); A.J.James and J.E.Thomas, Wales at Westminster (Llandysul: Comer, 1981).

17. See J.E. Ambrose, A Geographical Study of Language Borders in Wales and Brittany. Unpublished Ph.D. thesis, University of Glasgow, 1979, see also J.E. Ambrose and C.H. Williams, op.cit. ftn 12.

18. S. Price, M. Fluck and H. Giles, "The Effects of Language of Testing on Bilingual Pre-Adolescents' Attitudes Towards Welsh and Varities of English," Journal of Multilingual and Multicultural Development, 4 (1983) pp.149-61

19. It should be noted that my objection is based mainly on those studies which take one sample location as representative of Wales, and then compare these results from others derived in one sample location in another context eg. Belgium, or Quebec.

20. J.C. Hudson, Geographical Diffusion Theory, Northwestern Studies in Geography, 19, (1972), pp. 8-25; see also C.H. Williams, "The Spatial Analysis of Welsh Culture," Etudes Celtiques, 19 (1982), pp.283-322 for a discussion of the 1961 principal components analysis.

21. The discussion on component analysis is taken from the more detailed treatment of Wales in C.H. Williams (ed.), National Separatism (Cardiff: University of Wales Press, 1982) esp pp.166-179.

22. The Catholic distribution on this component reflects three influences, the original pattern of Irish Catholic immigration to the larger urban areas in the late nineteenth century, the twentieth century influx of displaced Italian and Polish 'guest workers' and refugees, and most recently the immigration of British Catholics, especially from the Merseyside conurbation to coastal north Wales.

23. Martin J. Ball and Sian M. Munro, "Language Assessment Procedures for Linguistic Minorities : An Example, "Journal of Multilingual and Multicultural Development, 2, (1981) : 231-41.

24. Ibid. p238.

25. See, for example, Glyn Williams, (ed.), Social and Cultural Change in Contemporary Wales (London : Routledge and Kegan Paul, 1978), esp pp. 166-92, 193-205.

26. S. Price, M. Fluck and H. Giles, "The Effects of Language of Testing on Bilingual Pre-Adolescents Attitudes Towards Welsh and Varities of English," Journal of Multilingual and Multicultural Development, 4 (1983) : 149-61

27. C.H. Williams, "An Ecological and Behavioural Analysis of Ethnolinguistic Change in Wales," in H. Giles and B. Saint-Jacques (eds.) Language and Ethnic Relations (Oxford: Pergamon, 1979).

28. S. Price et.al. op.cit. p.159.

29. See D. Cartwright and C.H. Williams, "Bilingual Districts as an Instrument in Canadian Language Policy," Transactions of the Institute of British Geographers, 7 (1982): 474-93.

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